



# Modernizing financial markets infrastructure

CLS builds a settlement platform to shape the future of foreign exchange

by David Terry

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Every day, banks, corporations and investors trade currency worth trillions of dollars on the foreign exchange (FX) market—in full confidence that whether they are trading British pounds for Mexican pesos or Swiss francs for Hungarian forints, they will receive the currency they paid for. One of the main reasons for that confidence is CLS—a company whose settlement services sit at the heart of the global FX ecosystem.

The safety of modern FX markets is a relatively recent phenomenon. Back in 1972, when the German bank Bankhaus Herstatt collapsed, many of its FX



counterparties faced serious losses. In response, the global FX ecosystem began looking for ways to mitigate systemic risk, and in 2002, through unprecedented cooperation across the community, CLS was established with 39 member organizations and seven currencies.

Today, the company's members include over 70 of the world's most important financial institutions, and over 25,000 more use its services to settle FX transactions across 18 of the world's most actively traded currencies.

At a high level, the value CLS offers is in providing a platform that ensures that the payment instructions for both sides of an FX trade are settled simultaneously, eliminating the risk that that one party delivers the currency it sold but does not receive the currency it bought. At the same time, CLS provides multilateral netting of payments, which reduces the amount of capital that each market participant needs to pay to settle their trades, shrinking funding requirements by an average of 96%.

“In the midst of adversity, the CLS team and IBM teams worked really closely together. The dedication from both sides was exceptional.”

**Ritesh Gadhiya**

Head of Settlement Applications, CLS

On average,  
CLS settles  
USD

5.5 trillion

of FX payment instructions per day

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# Settlement at scale

Since CLS first started operating in 2002, the company has built its business around CLS Settlement, a settlement platform developed, hosted and managed by IBM. The platform has been hugely successful, helping CLS scale its business to handle an average of over USD 5.5 trillion and one million instructions per day. Even during times of unusual market activity, the system has coped admirably. For example, in 2020 it handled a peak volume of over 2.6 million instructions worth USD 13.4 trillion in a single day. To put these numbers in perspective: USD 13.4 trillion is approximately equivalent to the entire annual gross domestic product of China in 2018.





Despite its success, the system was a product of its time. Application code was tightly coupled to legacy middleware that was difficult to support and limited the company's agility in developing, testing and launching new services.

To facilitate the evolution of FX markets in the years to come, CLS embarked on an initiative to modernize the CLS Settlement platform—moving to a new infrastructure, rewriting the core application from C to Java and taking greater ownership of its development. The goal of the initiative was to enable convergence between the platform and the company's Unified

Services Platform (USP), which already supports other CLS products such as CLS ClearedFX and CLS Now.

This convergence initiative required a fundamental shift in the relationship between CLS and IBM, from a customer-supplier relationship to a much more collaborative partnership. To help drive this change, the company's senior executives took an active role in sponsoring the project and put it under the control of a dedicated program director, who utilized the experience of IBM to implement effective plans and governance to successfully deliver this ambitious transformation.

# Overcoming challenges together

Just as the team began to gel after a project workshop hosted by CLS in New Jersey, everything changed. The COVID-19 pandemic put most of the world into lockdown, which meant that project offices in New Jersey and New York in the US, Portsmouth and London in the UK, and Pune and Chennai in India, had to close down and teams had to work from home.

Despite these challenges brought on by the pandemic, the team was able to adapt its delivery methodology and take advantage of the new mode of operations to improve



communication and flexibility within the distributed team.

Moreover, the project's leadership gave team members the flexibility to set their own schedules to work around childcare and family obligations. The result was greater productivity, as many team members began working at times that maximized the overlap between geographies, instead of sticking to regular local working hours.

"We took the view that it doesn't matter when or where people work—we all work asynchronously," explains Rachel Lum, Executive Partner at IBM.

"That was the culture we promoted, and everyone bought into it."

The positive culture quickly fostered a "one team" mentality, and while CLS and IBM notionally focused on different aspects of the project, it became common for team members from both organizations to work together as one.

"In the midst of adversity, the CLS and IBM teams worked really closely together," says Ritesh Gadhiya, Head of Settlement Applications at CLS.

"The dedication from both sides was exceptional."

# Zero room for error

The goal of the project was to build and deploy a modern application that could handle the vast scale and complexity of FX settlement flawlessly—and since the CLS settlement service is a critical part of the world's financial market infrastructure, there was zero room for error.

As a result, the team planned to take every possible precaution to mitigate risk and ensure that the new application would seamlessly meet the requirements of the foreign exchange markets.

The team began by building on extremely well-tested and standardized platforms that have been proven at scale by thousands of other financial



services organizations. They developed the new application in Java running on [Red Hat® Enterprise Linux®](#) and using a variety of IBM middleware, including [IBM® MQ](#), [IBM WebSphere® Application Server](#), [IBM Workload Scheduler](#) and [IBM Security® Verify Access](#).

The CLS and IBM team then rigorously tested the application both internally and with each of the 74 member banks—an extremely complex and challenging process that involved coordinating and confirming the changes required to each bank’s

systems, as well as making changes to the new CLS application itself.

This testing phase was delivered on schedule, which CLS considers a major achievement.

“The project sparked some innovations in the way we test our systems,” says Gadhiya. “For example, we built a Risk Model Test Engine (RMTE) which we used to run simulations of more than 28,000 scenarios and the equivalent of 100 years of production data to stress test our algorithms.”

# Parallel running

After comprehensive integration testing had given the team a high level of confidence in the new application, the next phase was to run the system in parallel with the legacy platform. Rigorous monitoring and analysis was used to confirm that both systems would consistently produce the same results for the market.

This parallel phase was designed to enable frequent data migrations to reset the state of the new application in case its behavior diverged from the existing system. However, in practice, over the course of the six-month parallel run, the team only needed to use this functionality once to address a software problem.



“The software stabilized very quickly once we started the parallel run phase, and the quality of CLS’s data is extremely high, so we found there was very little need for fixes or data migrations,” says Patrick Smith, Program Manager at IBM. “In fact, even when CLS had the biggest single day of transactions in its history, the new application coped with nearly three times the normal workload, and the outcomes were as expected. We were delighted because it proved that we could potentially cut over even

with a very high level of transactions without issues.”

Toward the end of the parallel phase, the emphasis increasingly shifted to preparations for the final production cutover event. The team ran multiple full-scale rehearsals, each lasting 20 to 30 hours and involving many stakeholders from across the distributed project team. Once again, the need to work effectively within the restrictions imposed by the global pandemic not only created challenges,

but also led to new ideas and process improvements.

For example, instead of relying on established teams to oversee each step in the cutover process, the team created a much more resilient model, with multiple resources available across multiple locations to act as backups in case any individual team member suffers connectivity, power or other issues at critical stages. This is a model that CLS will be able to utilize for future change and transformation activity.

# A platform for the future

After all the tests and rehearsals, the team was confident that it could move forward with the final production cutover—but in a project of this scale and importance, there was still a sense of nervousness in the air.

“No matter how well-prepared you are, you never quite know what might happen on go-live day,” says Gadhiya. “The whole team was so invested in the project that they wanted to follow the cutover as it happened, so we set up a live virtual control room that everyone could log in to and see how we were progressing.”

In fact, there was little need for anxiety. The cutover was a complete success, with zero high-severity issues, and only



a handful of minor hiccups that were quickly resolved.

“We were pleasantly surprised by the smoothness of the cutover,” says Gadhiya. “We believe we’re the first company in the financial markets infrastructure sector to attempt a modernization project on this scale, and together with IBM, we’ve shown the industry that this kind of change is possible.”

CLS’s new platform mitigates business risk by removing legacy middleware in favor of a flexible, industry-

standard solution, with loosely coupled components that facilitate development, testing and independent management. This will help to accelerate the development of new products and services, enabling CLS to maintain its position as an innovator in the FX markets.

The platform also provides improved monitoring capabilities for performance, capacity and security, enables the automation of previously manual system management tasks, and increases overall resilience. For example, in the event of a disruption, CLS will be able to resume operations well within the

recovery time objective (RTO) of two hours specified by the Principles of Financial Markets Infrastructure (PFMI).

Gadhiya concludes: “The completion of convergence marks the beginning of a new era for CLS, giving us a single, modern platform that we can use to build and run multiple services and develop new initiatives. Making it easier to grow and evolve our systems, puts us in a stronger position to bring new offerings to market and help our stakeholders mitigate settlement risk even more effectively.”



### About CLS

Created by the FX market, for the FX market, [CLS](#) (external link) provides a global settlement infrastructure that reduces systemic risk and provides standardization for participants in many of the world's most actively traded currencies. Its members include more than 70 of the world's most important financial institutions, and over 25,000 participants use its settlement services.

### Solution components

- IBM® MQ
- IBM Consulting—Hybrid Cloud Consulting and Services
- IBM Security® Verify Access
- IBM WebSphere® Application Server
- IBM Workload Scheduler
- Red Hat® Enterprise Linux®

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